

27. The method according to claim 1, wherein said thin film manganate material has a Curie temperature above 273°K.

### **REMARKS**

Claims 1-22 are pending in the instant application.

#### **Objection of Claim Under 37 C.F.R. § 1.75(c)**

In the December 4, 2002, claim 15 was objected to under 37 C.F.R. § 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

In response, applicant amends herein, claim 15, to claim dependency from independent claim 1. Based on such amendment, claim 15, is of proper dependent form. Accordingly, applicant respectfully requests the objection of claim 15 be withdrawn.

#### **Rejection of Claim Under 35 U.S.C. § 112 First Paragraph**

In the December 4, 2001 Office Action, claim 6 was rejected under 35 U.S.C. § 112 first paragraph, because the specification, while being enabling for forming doped A-site deficient manganate films on a substrate, the manganate films having an  $\text{MnO}_3$  portion, do not reasonably provide enablement for the manganate materials recited in claim 6.

In response, applicant amends herein claim 6 to delete the limitation "LaMgMnO, LaCaMnO, LaSrMnO, and LaBaMnO" and substitutes therefor " $\text{La}_x\text{Mg}_y\text{MnO}_3$ ,  $\text{La}_x\text{Ca}_y\text{MnO}_3$ ,  $\text{La}_x\text{Sr}_y\text{MnO}_3$ ,  $\text{La}_x\text{Ba}_y\text{MnO}_3$ , wherein  $0.5 < (x+y) < 0.9$ ". Such amendment provides for a limitation, which is fully supported and enabled by the instant specification (See, page 10, lines 24-27 of the instant specification). On the basis of such amendment, claim 15 is enabling within the meaning of 35 U.S.C. § 112 and as such applicant respectfully requests the rejection be withdrawn.

#### **Rejection of Claims Under 35 U.S.C. § 112 Second Paragraph**

In the December 4, 2001 Office Action:

claims 1-22 were rejected under 35 U.S.C. § 112 second paragraph, because the term “thin” is not defined by the claims; and

claims 17-22 were rejected under 35 U.S.C. § 112 second paragraph, because there is insufficient antecedent basis for the components mentioned in such claims (*i.e.*, La, Ca, Sr, and Ba).

In response, applicant amends herein claims 1, 6, and 17-22 to delete all references to the limitation “thin film”. Such amendments remove the limitation which is considered indefinite and rather defines the invention as “a method of making a doped A site deficient manganate material on a substrate .etc.”. As such, claims 1-22 as amended particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In further response, applicant amends herein claim 1, to define the manganate material based on a formula, which recites the components, La, Mg, Ca, Sr and Ba as well as the stoichiometric limitations of such components as further defined by claims 17-22.

Based on such amendments, claims 1-22 are definite within the meaning of 35 U.S.C. § 112 second paragraph. Accordingly, applicants respectfully request the rejection of such claims be withdrawn.

**Rejection of Claims Under 35 U.S.C. §103(a)**

In the December 4, 2001 Office Action, claims 1-4 and 6-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,487,356 (hereafter referred to as “Li”).

Li, is directed to a chemical vapor deposition method of forming films showing a giant magnetoresistance, wherein such films are described as  $(La_{1-x}A_x)MnO_3$ , where  $x + y = 1$ . Li, further discloses that films having the formula  $(La_{0.72}Ca_{0.25})MnO_3$  are known in the art to exhibit a GMR effect and have been previously deposited by PVD methods.

Applicant’s invention, as more particularly defined in amended claim 1, is directed to a method of making A-site deficient manganate materials having the general formula  $La_xM_yMnO_3$ , where M = Mg, Ca, Sr, or Ba, and  $0.5 < (x+y) < 0.9$ . Claim 1 and claims 2-22, which depend therefrom, therefore demarcate manganate materials in a different compositional regime than that of the magnetoresistive film material of Li.

When determining differences between the prior art and the claimed invention, it is necessary for the Examiner to consider applicant's invention as a whole, which provides a CVD method of forming magnetoresistive materials having Curie temperatures at or above room temperature. Applicant's invention solves a need in the art for such materials having room temperature Curie temperatures and a method of making such materials. Li, does not solve such a problem, nor does Li suggest, understand or expect that by making a material that is A-site deficient, the Curie temperature of a magnetoresistive film would rise to, at, or above room temperature.

Li provides no derivative basis for the applicants' claimed invention, since Li is broadly directed to a method of making metal oxides of the formula  $\text{La}_x\text{A}_{1-x}\text{MnO}_3$ , wherein the corresponding value of  $(x + y)$  is 1. In other words, Li is directed to a method of making stoichiometrically regular films. Li therefore teaches away from applicant's claimed invention wherein  $(x + y)$  is in the range between 0.5 and 0.9.

In such demarcated stoichiometric regime, the manganate material of applicant's invention achieves remarkably high Curie temperatures, as set out in Table 2 on pages 17 and 18. As stated in the sentence bridging pages 4 and 5 of the instant application, the manganate films of the present invention "exhibit Curie temperatures at or above room temperature and therefore are technologically valuable and a significant advance in the art." Claim 27 has been added to recite such material compositions.

On such basis, claims 1-22 are fully patentably distinguished over Li et al., under 35 U.S.C. § 103(a). Applicant respectfully requests the withdrawal of such rejection and reconsideration of claims 1-22 and 27.

In the December 4, 2001 Office Action, claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,487,356 (hereafter referred to as "Li"), in view of U.S. Patent No. 6,010,969 (hereafter referred to as "Vaartstra") and U.S. Patent No. 5,659,101 (hereafter referred to as "Biagini").

As stated hereinabove, Li is directed to a chemical vapor deposition method of forming films showing a giant magnetoresistance, wherein such films are described as  $(\text{La}_{1-x}\text{A}_x)\text{MnO}_3$ , where  $x + y = 1$ . Li further discloses that films having the formula  $(\text{La}_{0.72}\text{Ca}_{0.25})\text{MnO}_3$  are known in the art to exhibit a GMR effect and have been previously deposited by PVD methods.

Vaartstra, is directed to a chemical vapor deposition method of depositing films useful in semiconductor applications from carboxylate complexes and Biagini, is directed to the use of various compositions in forming polymers from metal salts having the formula  $ML_3$ . Biagini, further teaches that L may be any ligand except halogen and then proceeds to cite specific examples such as pivalates, acetylacetonates and hexafluoroacetylacetonates.

Applicant's claim 5 is directed to a liquid delivery chemical vapor deposition method of forming a doped A site deficient manganate materials having a formula  $La_xM_yMnO_3$ , where M = Mg, Ca, Sr, or Ba, and  $0.5 < (x+y) < 0.9$  from precursors including metal pivalate Lewis base adducts.

All three references whether singly or in combination fail to teach a CVD method used to deposit A-site deficient magnetoresistive materials having Curie temperatures, at, or above room temperature. Additionally, not one of the cited references suggests a CVD method for making A-site deficient  $(La_xA_y)MnO_3$  materials having a stoichiometry of  $0.5 < (x+y) < 0.9$ .

Accordingly, and based on the foregoing, applicants respectfully request the withdrawal of the rejection of claim 5 under 35 U.S.C. §103(a).

In the December 4, 2001 Office Action, claims 19-22 were rejected under 35 U.S.C. §103(a) as obvious over the combination of U.S. Patent No. 5,487,356 (hereafter referred to as "Li") and U.S. Patent No. 6,060,420 (hereafter referred to as "Munakata").

As stated hereinabove, Li, et al., is directed to a chemical vapor deposition method of forming films showing a giant magnetoresistance, wherein such films are described as  $(La_{1-x}A_x)MnO_3$ , where  $x + y = 1$ . Li further discloses that films having the formula  $(La_{0.72}Ca_{0.25})MnO_3$  are known in the art to exhibit a GMR effect and have been previously deposited by PVD methods.

Munakata et al., teaches a method of making materials having a general formula  $(A'_{1-x}A''_x)_{1-\alpha}(B'_{1-y}B''_y)O_{3-\delta}$  in which A' may be La, Nd, Gd and Y; A'' may be Pr, Ce, Ba, Sr, or Ca, K or Pb; **B' and B'' are different and selected from Mn, Co, Ti, Fe, Ni, Cu and Al;**  $0 < \alpha < 0.2$ ;  $0 \leq \delta \leq 1$ ;  $0 < x < 1$  and  $0 < y < 1$ . The materials of Munakata et al., are made by a method comprising mixing powders of carbonates or hydroxides of the required metals; pulverizing the powders; combining the pulverized

powder with citric acid and water; dehydrating the mixture to form a citrate composite; and calcining the citrate composite.

Applicant's claims 19-22 have been amended herein to more specifically claim that which applicant regards as the invention. More specifically, applicant has amended claims 19-22 to better define the stoichiometry of the  $x + y$  components to the magnetoresistive films as  $0.5 < (x+y) < 0.9$ .

Li and Munakata, whether alone or in combination, fail to teach or suggest a CVD method of making A-site deficient magnetoresistive  $(La_xA_y)MnO_3$  materials having a stoichiometry of  $0.5 < (x+y) < 0.9$  and Curie temperatures at or above room temperature. Further, there is no motivation in the art as a whole or the references described herein to move in the direction of applicant's claimed process for making magnetoresistive materials having a Curie temperature that is at or above room temperature.

On the basis of the foregoing, applicant respectfully requests the Examiner withdraw the rejection of claims 19-22 under 35 U.S.C. § 103(a).

**Fee Payable For Added Claim 27**

The addition of new dependent claim 27 increases the total number of claims beyond the number previously paid for at the time of filing the application. Accordingly, please deduct the fee of \$18.00 as the fee payable under 37 C.F.R. § 1.16(c) from Deposit Account No. 50-0860 of Advanced Technology Materials, Inc. Applicant does not believe that any additional fee is due in connection with the entry of this Amendment, however, if it is determined that a fee or charge is properly payable, the same is hereby authorized to be charged to Deposit Account No. 50-0860.

**CONCLUSION**

With the amendment of claims 1-22, and addition of dependent claim 27, all issues of allowability of the instant application are respectfully submitted to be resolved favorably to applicant.

It therefore is requested that the Examiner responsively issue a Notice of Allowability for claims 1-22 and 27, so that the application can be passed to issue at an early date.

If any issues remain, incident to formal allowance of the application, the Examiner is requested to contact the undersigned agent at (203) 794-1100 ext 4184 to resolve same.

Respectfully submitted,



Maggie Chappuis  
Agent for Applicant  
Registration No. 45,735

Advanced Technology Materials Inc.  
7 Commerce Drive  
Danbury CT 06810  
Telephone (203) 794-1100 ext 4184  
Facsimile (203) 797-2544  
Docket No. ATMI 249 DIV